

ABSTRACT

A relaxor ferroelectric solid solution single crystal is made of a lead-based complex perovskite compound expressed as any of $(1-x)\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3 \cdot x\text{PbTiO}_3$, $(1-x)\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3 \cdot x\text{PbTiO}_3$, and $(1-x)\text{Pb}(\text{In}_{1/2}\text{Nb}_{1/2})\text{O}_3 \cdot x\text{PbTiO}_3$, where a composition ratio x is larger than 0.1 and smaller than 0.2. The relaxor ferroelectric solid solution single crystal is capable of making transitions, at temperatures below the Curie temperature, between a first state which has a high permittivity and blocks optical transmission and a second state which has a low permittivity and allows optical transmission. The relaxor ferroelectric solid solution single crystal undergoes a transition to the second state if an electric field above a threshold is applied thereto in the first state. The relaxor ferroelectric solid solution single crystal undergoes a transition to the first state if heated to or above the Curie temperature in the second state.